Technical information Monobloc burners

-weishaupt-

Weishaupt burners
WKmono 80 1 100-17 000 kW



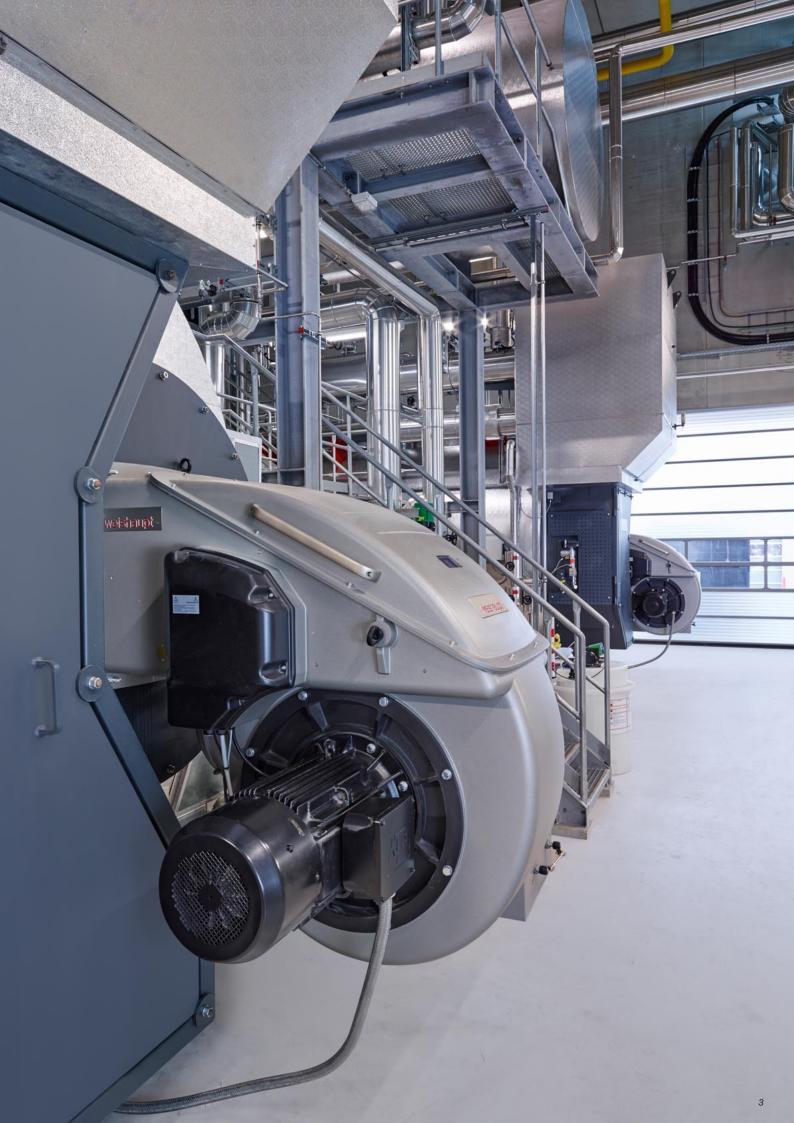
Flexible all-rounder.

For more than six decades, Weishaupt burners have proven themselves on a wide variety of heat generators and process plant. Their success stems from a relentless demand for high-quality materials and workmanship, and uncompromising quality control standards.

The WKmono 80 shares its platform with the duobloc WK80 burner and has an impressively large capacity range of 1 100 to 17 000 kW. It is available in NR and multiflam® versions and is suitable for natural gas, LPG, and gas oil, making it extremely flexible in regard to the applications for which it is suitable.

All burners are manufactured at the company's main plant in Schwendi in southwestern Germany, where a high proportion of in-house production enables a rapid response to individual requirements. Weishaupt's product range also runs the gamut of modern instrumentation and control equipment, including fully comprehensive solutions for complex building automation projects.

Future-oriented, efficient, flexible.



Use.

Fuels

- Natural gas
- LPG
- Class D gas oil per BS 2869/IS 251
- Class A2 gas oil per BS 2869/IS 251
- Green fuels

Further details on green fuel specifications can be found on page 23.

The suitability of fuels of differing quality must be confirmed in advance with Weishaupt.

Applications

Weishaupt WKmono 80 burners are suitable for intermittent firing and continuous firing on:

- EN 303-compliant heat generators
- LTHW boilers
- HTHW boilers
- Steam boilers
- Air heaters
- Certain process applications

Permissible ambient conditions

- Ambient temperature
 - -15 °C to +40 °C for gas firing
 - -10 °C to +40 °C for oil firing
- Maximum 80 % relative humidity, no condensation
- Combustion air must be free of aggressive substances (halogens, chlorides, fluorides, etc.) and impurities (dust, debris, vapours, etc.)
- Adequate ventilation must be ensured for operation in enclosed spaces
- For plant in unheated areas, certain further measures may be required



Use of the burner for other applications or in ambient conditions not detailed above is not permitted without the prior written agreement of Max Weishaupt GmbH. Service intervals will be reduced in accordance with the more extreme operational conditions.

Protection class

IP 54

EU directives and regulations

The burners are independently tested and certified by a Notified Body. They fulfil the applicable requirements of the following EU directives and regulations:

EMC EMC Directive 2014/30/EU

LVD Low-Voltage Directive 2014/35/EU

MD Machinery Directive 2006/42/EC

GAR Gas Appliance Regulations (EU) 2016/426

PED¹⁾ Pressure Equipment Directive 2014/68/EU

RoHS Restriction of Hazardous Substances
Directive
2011/65/EU

The relevant applied standards are detailed in the declaration of conformity.

All burners are labelled with:

CE mark

Type-tested gas burners are labelled with:

- CE-PIN per Regulation (EU) 2016/426
- Identification number of the Notified Body

Type-tested oil burners are labelled with:

DIN CERTCO label and Reg. No.

Type-tested dual-fuel (gas/oil) burners are labelled with:

- CE-PIN per Regulation (EU) 2016/426
- Identification number of the Notified Body
- DIN CERTCO label and Reg. No.

¹⁾ With the appropriate choice of equipment.

Compact and powerful.

WKmono burners represent a synergy of monobloc and duobloc burner design. They make use of various components and housing elements from the modular system of the existing WK-series burners, while retaining a compact and service-friendly design.

A rail system, for example, makes it easy to withdraw and insert the mixing assembly of the 80/2-size burner during servicing. Tried-and-tested safety shutoff devices, pump stations, oil regulators, and other components from the WK burner range all provide a high degree of safety and reliability.

Not all fuels are the same

Specially designed burner mixing assemblies, tailored to the fuel, guarantee the reliable combustion of various oils and gases. This latest generation of monobloc burner also shares in Weishaupt's guiding principles of cost-effectiveness, efficiency, and reliability.

Digital reliability

These two words describe digital combustion managers in a nutshell. Their adaptability and versatility leave nothing to be desired. VSD, CO monitoring, O_2 trim, and combined CO control with O_2 trim are tried-and-tested options. There is also a data interface for communication with superordinate control systems.



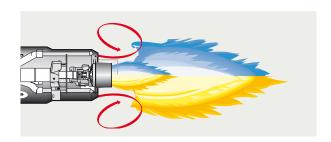
NR - NO_x Reduced

- → Standard mixing assembly for gas and dual-fuel burners
- → Reduced NO_x emissions when firing on gas



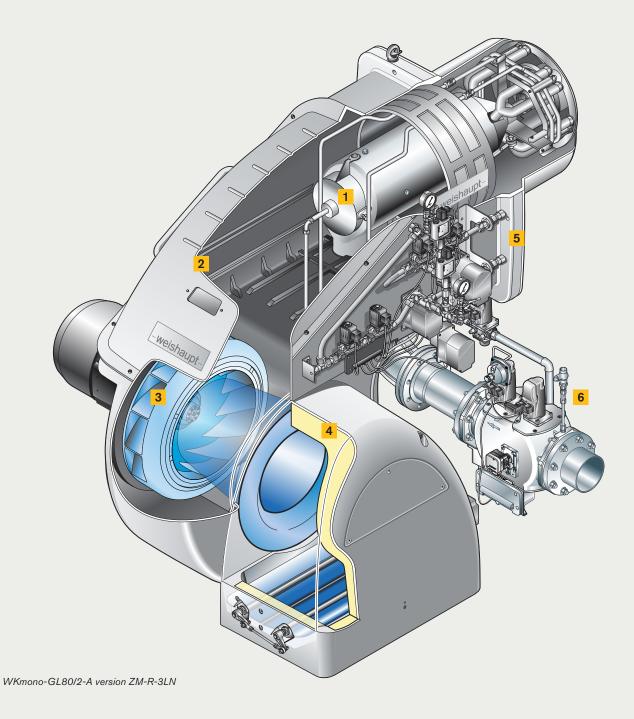
3LN - multiflam®

- → Low-NO_x mixing assembly for gas, oil, and dual-fuel burners
- $\boldsymbol{\rightarrow}$ Low NO_x emissions when firing on either gas or oil



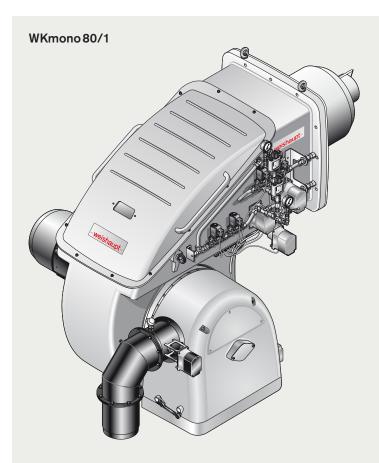
4LN - multiflam® for flue gas recirculation (FGR)

- → Ultra-Low NO_x mixing assembly for gas and dual-fuel burners
- → Low NO_x emissions when firing on oil (oil-fired operation without FGR)
- → Extremely low NO_x emissions when firng on gas (gas-fired operation with FGR)



- 1 Mixing assembly can be withdrawn through the burner housing
- 2 Large housing cover provides optimal accessibility
- 3 High-capacity fan wheel
- 4 The sound-attenuated air inlet can be constructed in an alternate orientation
- 5 Oil fed to the burner from an external oil pump station
- 6 Low-pressure gas valve train

Maximum flexibility.



Burner motor on the left or right-hand side

The burner can be constructed with the positions of its motor and air inlet housing interchanged if necessary. This high degree of flexibility can facilitate the problem-free mounting of two closely adjacent burners on the front of a twin-furnace boiler, for example.

Smaller air inlet housing for optimal floor clearance

The smaller air inlet housing of the WKmono 80/1 ensures there is sufficient clearance between the air inlet and the floor.

Factory-fitted FGR connection

The burner's connection for temperature-compensated flue gas recirculation, which achieves stable and reliable operation with ultra-low NO_x emission values, is fitted and tested at the factory.

Large capacity with a low-pressure gas supply

Despite the WKmono 80/1's enormous capacity range of up to 13 000 kW, it is possible to connect the burner to a low-pressure gas supply, with up to 300 mbar upstream of the governor (P_u) and up to 210 mbar downstream (P_d).



Burner motor on the left-hand side



Burner motor on the right-hand side

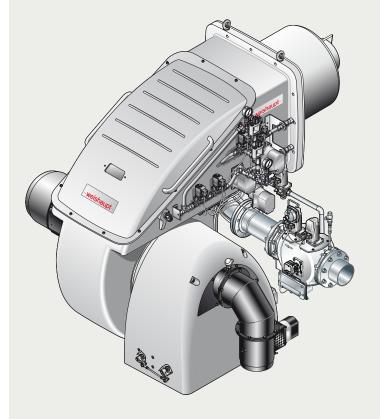


Smaller air inlet for increased clearance



Connection for flue gas recirculation

WKmono80/2



Mixing assembly's servicing position

To keep maintenance from having to be a feat of strength, the WKmono 80/2 has an integrated rail system that makes it much easier to insert and remove the mixing assembly. Additionally, the mixing assembly can be tipped into a servicing position that improves access to the wear-and-tear parts considerably.

Orientable inlet housing for optimal floor clearance

The WKmono 80/2 can be constructed with its air inlet housing rotated by 90° or 180°, making it possible to install the burner on appliances where there would otherwise be insufficient clearance between the air inlet and the floor.

Factory-fitted FGR connection

The burner's connection for temperature-compensated flue gas recirculation, which achieves stable and reliable operation with ultra-low NO_x emission values, is fitted and tested at the factory.

Large capacity with a low-pressure gas supply

Despite the WKmono 80/2's enormous capacity range of up to 17 000 kW, it is possible to connect the burner to a low-pressure gas supply, with up to 500 mbar upstream of the governor (P_u) and up to 360 mbar downstream (P_d).

Burner motor on the left or right-hand side

The burner can be constructed with the positions of its motor and air inlet housing interchanged if necessary. This high degree of flexibility can facilitate the problem-free mounting of two closely adjacent burners on the front of a twin-furnace boiler, for example.



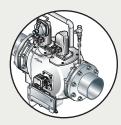
Mixing assembly in servicing position



Air inlet housing rotated by 90° or 180°

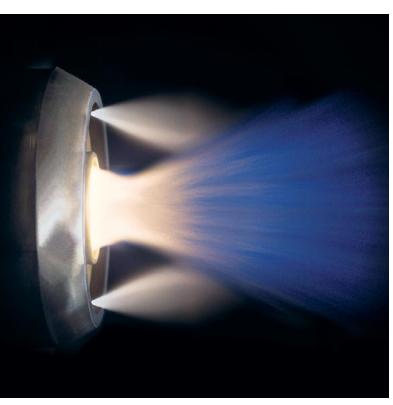


Connection for flue gas recirculation



Low-pressure gas supply

Reduced emissions with 3LN burners.



Typical flame pattern of a multiflam® burner

The multiflam® principle, that was developed and patented by Weishaupt, is an innovative way of greatly reducing the emission of nitrogen oxides from combustion plant.

Right at the core of Weishaupt's multiflam® technology lies its special mixing assembly design. Fuel is distributed among several nozzles and then combusted in a primary and a secondary flame. Temperature in the flame's core is considerably reduced, which results in an effective reduction of nitrogen oxides.

The wide range of ratings across which multiflam® burners are now available is equally outstanding. All the way from the WM 10 monarch®-series burner right up to the WK 80 industrial-series burner, there is now a multiflam® burner for outputs ranging from 100 up to 23 000 kW.

Weishaupt multiflam® burners have been proving themselves in the field for many years. As fully fledged gas, oil, and dual-fuel burners, they are always the first choice for achieving low NO_x emission limit values without resorting to external measures.

Good combustion figures are dependent on more than just the burner. They also depend on the combustion chamber geometry and its thermal loading, and the design of the heat generator (three-pass/through-pass type).

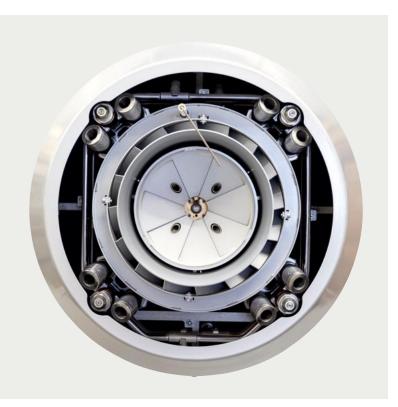
When Weishaupt guarantees the NOx emissions for a particular application, the guarantee can only be made with reference to certain predefined constraints, including thermal loading, the combustion air temperature and humidity, medium temperature, measurement tolerances, etc.



- 1 Primary gas nozzles
- 2 Primary oil nozzle
- 3 Secondary gas nozzles
- 4 Secondary oil nozzles

The 3LN multiflam® mixing assembly of a WKmono burner

Reduced emissions with 4LN burners.



Dual-fuel 4LN multiflam® mixing assembly

Weishaupt 4LN-version burners are an innovative development of our patented multiflam® technology combined with flue gas recirculation (FGR).

A swirl body in the secondary air area and a longer flame on the primary diffuser lies at the heart of this further development of larger multiflam® burners.

In combination with external FGR, the swirl body generates an intensive mixing of the fuel, air, and recirculated flue gas. The primary flame, which is adapted for high flue gas recirculation rates, ensures the flame remains stable at all stages of operation.

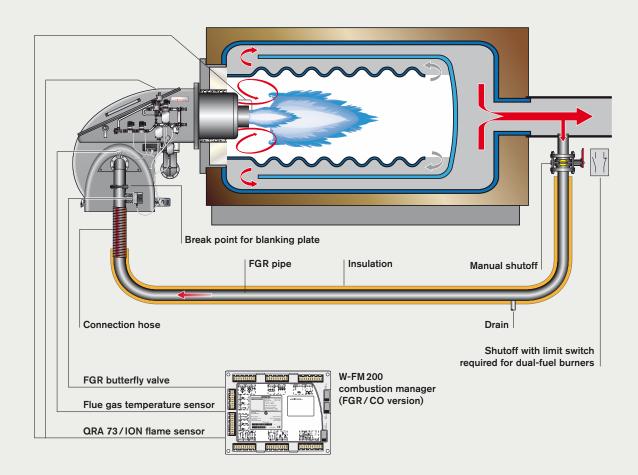
How does FGR work?

Flue gas recirculation affects the formation of thermal NO_x by reducing the concentration of oxygen in the combustion air. This results in increased air flow speed, which reduces the dwell time of the combustion gases in the hot reaction zone and thereby lowers the flame temperature.

Note for oil firing

When a dual-fuel burner is firing on oil, the FGR system should normally be closed off by means of a separate shutoff assembly that is installed at the takeoff point and monitored by a limit switch.

Operating the FGR system while the burner is firing on oil is only possible if the fuel meets specific prerequisites. It must be approved in advance by Weishaupt.





FGR connection point with actuator and Pt1000

Reliable and safe.

Digital combustion management means optimal combustion figures, continuously reproducible setpoints, and ease of use.

Weishaupt WKmono-series gas, oil, and dualfuel burners are equipped as standard with electronic compound regulation and digital combustion management. Today's modern combustion technologies demand a precise and continually reproducible dosing of fuel and combustion air. This is the only way to ensure optimal combustion figures over a long period of time.

Simple operation

Setting and control of the burner is achieved using a control and display unit. This is linked to the combustion manager via a bus system, enabling the user-friendly setting of the burner. The control and display unit has a clear text display with a choice of languages. An English / Chinese dual-screen version is available as an option if a Chinese-character display is desired.

Features to save energy and increase safety and reliability

VSD provides several benefits. It facilitates a soft start of the burner fan, keeping the start current to a minimum, and matches the speed of the fan to combustion air volume during operation, which saves electrical energy and reduces noise emissions.

 ${\rm O}_2$ trim saves fuel by means of a continual and extremely efficient optimisation of the combustion air. The system is controlled by a Lambda probe, which continually measures the oxygen content of the flue gas.

CO monitoring executes a safety shutdown of the burner should a predefined CO limit be exceeded, thereby ensuring the very highest degree of safety.

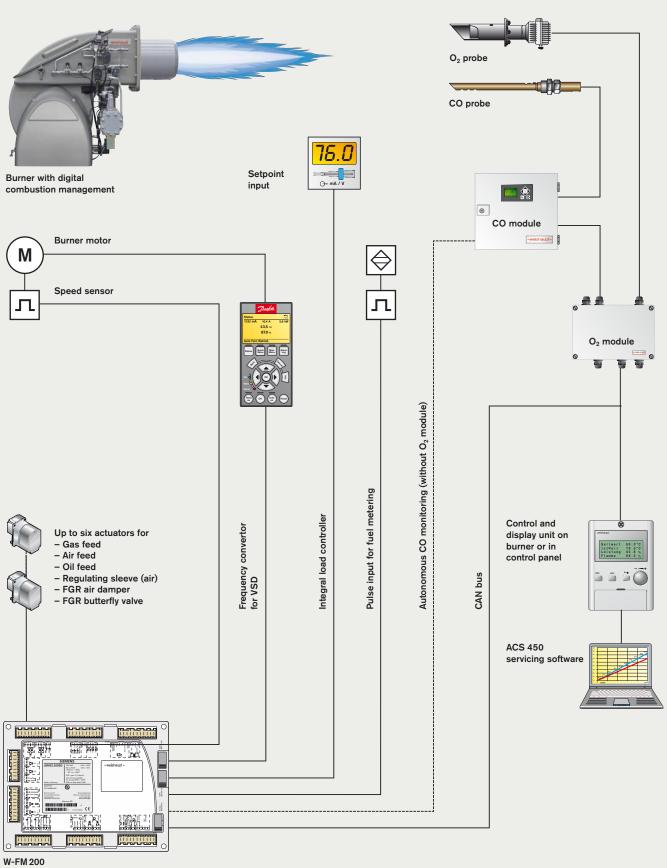
Combined CO control/O₂ trim ensures an ultimate degree of safety. CO emissions are continually monitored and, if the defined limit

is exceeded, the burner is operated with an increased amount of excess air for a short period of time before the O_2 trim returns the burner to its preset O_2 setpoint. However, should external influences be preventing a non-critical condition from being reached, then the burner will undergo a controlled shutdown.

General system overview Digital combustion management	W-FM 100	W-FM 200	W-FM 100 CMS
Single-fuel operation	•	•	•
Dual-fuel operation	•	•	•
Continuous firing >24 h	•	•	•
VSD	_	•	•
O ₂ trim	_	•	•
CO monitoring	_	0	•
Combined O ₂ trim and CO control	_	0	•
Temperature-compensated flue gas recirculation	_	0	•
Flame sensor for continuous firing	•	•	•
Extraneous light supression Flames oriented in the same direction, turndown ≤ 4:1	•	•	•
Extraneous light supression Flames oriented in the same direction, turndown > 4:1	_	● ²⁾	•2)
Max. numbers of actuators in electronic compound	4	6	8
Gas valve proving	•	•	•
Integral load controller	0	•	0
4-20 mA/0-10 V input signal	0/0	●/●	•/0
4-20 mA/0-10 V output signal	0/-	●/-	•/0
Clear text control and display unit	•	•	-
Control and display unit with colour graphical display	_	_	•
Removable control unit (max. distance)	100 m	100 m	100 m
Combustion manager can be panel mounted	•	•	•
Fuel consumption meter (switchable)	_	•	•
Combustion efficiency display	_	•	•
Digital interfacing	•	•	•
PC-supported commissioning	•	•	•

- Standard
- O Optional
- Not available

²⁾ External controller required



combustion manager

Schematic representation with W-FM200

Integration with building management.



Remote monitoring made easy via tablet or laptop

Digital combustion managers provide the basis for burner communications with other, higher-level systems. The eBus and Modbus protocols are available through coupling components.

All of the usual burner and, optionally, boiler functions can be monitored and controlled through a direct, digital connection to a building management system.

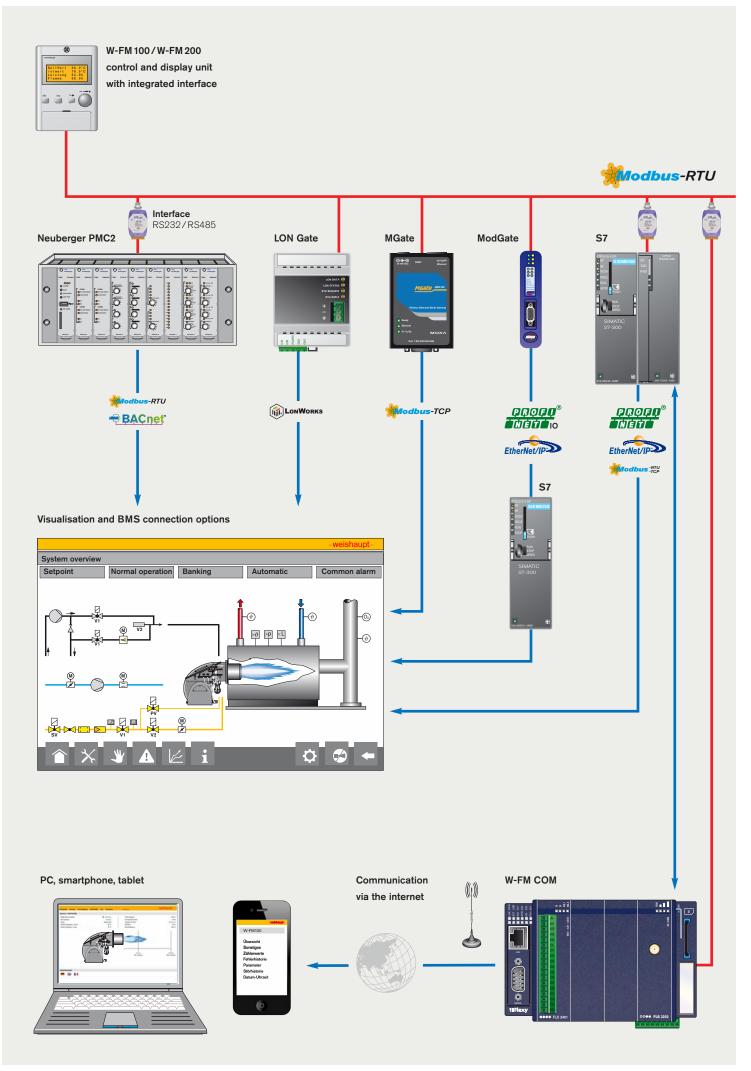
A graphical HMI is available to provide a user-friendly overview of the system with its setpoints and measured values. The touch-screen display allows specific functions to be adjusted and monitored, such as the system parameters and the setpoints of individual and multi-boiler plant and other ancillary equipment.

Controls specialists, Neuberger, are a part of the Weishaupt Group and they are able to design and implement complex control solutions.

Additional optional components enable connections to be made to systems using commonplace industrial standards, such as:

- Modbus TCP/IP
- Profinet I/O
- Modbus RTU
- BacNet
- etc.

Also available in Weishaupt's product range is the W-FM COM communications module. This transmits data securely over the internet so that it can be called up and displayed in a browser window on a PC, tablet, or smartphone, which facilitates accurate service planning for example. Even away from the internet you can be kept up to date with the operation of the burner: In the event of a safety shutdown or some other predefined trigger, an SMS text message will be sent automatically.

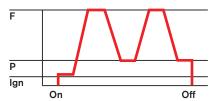


Load control Model designation WKmono 80

Sliding-two-stage (ZM)

 The burner is driven, via a two-point signal (e.g. thermostat or pressure control) to full or partial load in response to heat demand. Combustion remains CO and soot-free between load points.

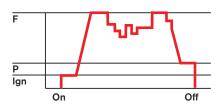




Modulating (ZM)

- An electronic controller makes infinitely variable load adjustments in response to heat demand.
- Available modulating executions:
 - W-FM 100 with optional load controller
 - W-FM 200 with standard load controller
- Alternatively, a controller can be mounted in the cover over the burner's integral electronic controls or in a separate control panel.

Modulating



F = Full load (nominal load)

P = Partial load (min. load)

Ign = Ignition load

Turndown ranges for gas, oil, and dual-fuel burners

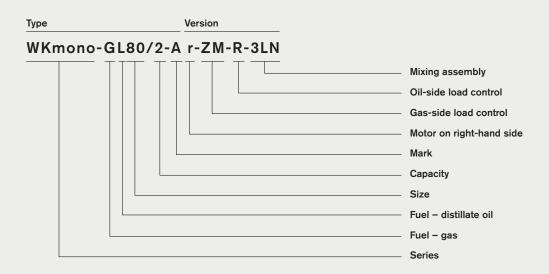
Burner	Version	Natural Gas	LPG	Gas Oil
WKmono80/1	Standard / NR	10:1	9:1	5:1
WKmono 80/1	3LN	10:1	7:1	5:1
WKmono 80/1	4LN	10:1	-	5:1

Burner	Version	Natural Gas	LPG	Gas Oil
WKmono 80/2	Standard / NR	7:1	5:1	4:1
WKmono 80/2	3LN	10:1	8:1	5:1
WKmono 80/2	4LN	10:1	-	5:1

Burners equipped with flue gas recirculation (FGR) have a reduced operating capacity.

The extent of this reduction in capacity has to be calculated on a case-by-case basis.

Model designation



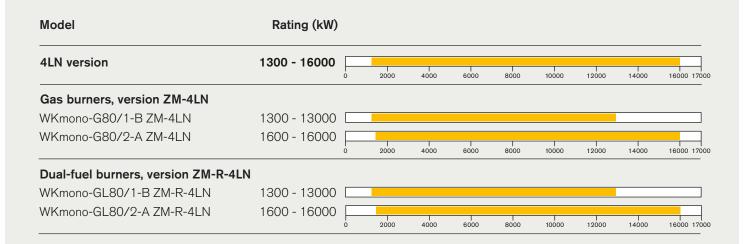
Details	Code	Meaning	Associated fuel
Series	WKmono	Weishaupt monobloc burner	
Fuel *	G L	Gas Class D/Class A2 oil	
Load control *	ZM R	Sliding-two-stage/modulating Sliding-two-stage/modulating	Gas Oil
Mixing assembly	– NR 3LN 4LN	Standard NO _x Reduced (gas-side) multiflam® multiflam® for FGR	Oil Gas/oil Gas/oil Gas/oil

^{*)} Dual-fuel burners use a combination of codes (GL, ZM-R-NR).

Operating ranges WKmono 80







Scope of delivery WKmono 80

Standard and NR versions

Fuel Version	Oil R	Gas ZM-NR	Dual-fuel ZM-R-NR
Burner housing, housing cover, burner motor, air inlet housing, fan wheel, combustion head, ignition unit, ignition cable, ignition electrodes, combustion manager with control unit, flame sensor, actuators, flange gasket, fixing screws	•	•	•
Digital combustion manager W-FM 100	•	•	•
Gas valve proving effected via W-FM and pressure switch	-	•	•
Class-A double gas valve assembly	-	•	•
Gas butterfly valve	_	•	•
Air pressure switch	•	•	•
Low gas pressure switch High gas pressure switch		•	•
Regulating sleeve in the mixing assembly	•	•	•
Actuators for compound regulation of fuel and air via W-FM: Air damper actuator Gas butterfly valve actuator Oil regulator actuator Mixing assembly actuator	• - •	• • -	•
Max. oil pressure switch in return Min. oil pressure switch in supply	•	-	•
MDK80 safety shutoff device with solenoid nozzle assembly, solenoid and pre-installed regulating nozzle, 2 oil solenoid shutoff valves, oil regulator	•	-	•
Motor on left-hand side of burner (as viewed from behind burner)	•	•	•
Burner-mounted oil pump	-	-	-
IP 54 protection	•	•	•

EN 676 stipulates that ball valves, gas filters, and gas pressure regulators form part of the burner supply (see Weishaupt accessories list). Please enquire or see the extra-equipment section of this brochure for further burner executions.

Standard

Not available

3LN version

Fuel	Oil	Gas	Dual-fuel
Version	R-3LN	ZM-3LN	ZM-R-3LN
Supply and return with 2 oil solenoid valves, oil regulator, nozzle head, pre-installed nozzles	•	-	•

4LN version

Fuel Version	Gas ZM-4LN	Dual-fuel ZM-R-4LN
Digital combustion management W-FM200	•	•
Supply and return with 2 oil solenoid valves, oil regulator, nozzle head, pre-installed nozzles	-	•

Green Fuels (GF)

Fuel Version		Oil Std./3LN	Dual-fuel Std./3LN/4LN
GF- M	Blended bio-oil (3.0–20.9%) Blend of mineral and esterified oils in accordance with fuel standard DIN SPEC 51603-6	•	•
GF- P	Paraffinic oil in accordance with fuel standard DIN/TS 51603-8	•	•
GF- B30	Blended bio-oil (21.0–30.9%) Blend of mineral and esterified oils in accordance with fuel standard DIN SPEC 51603-6	•	•
GF- B100	Blended bio-oil (31.0–99.9%) Blend of mineral and esterified oils in accordance with fuel standard DIN SPEC 51603-6	•/-	•/-/-
GF- B100	Bio-oil (FAME) Fatty Acid Methyl Ester in accordance with fuel standard EN 14214	•/-	•/-/-

- StandardNot available

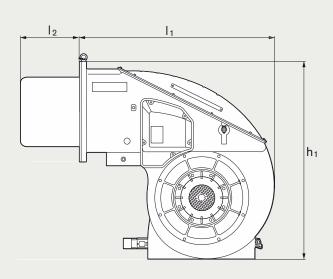
Extra equipment WKmono80

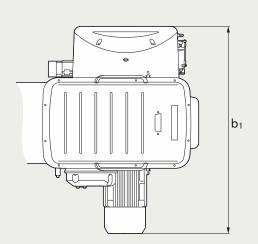
Fuel		Oil	Gas	Dual-fuel
Combustion head extension	by 150 mm by 300 mm	0	0 0	0
W-FM100 loose in lieu of inbuilt		0	0	0
Analogue signal convertor with load controller for W-FM 100		0	0	0
W-FM 200 in lieu of W-FM 100 with load controller, analogue signal convertor, VSD module, and optional connection of fuel meter				
	inbuilt loose	0	0	0
Extended functionality W-FM 200 for CO control / FGR		0	0	0
VSD with separate frequency convertor, FC as accessory equipment	W-FM200	0	0	0
Pt1000 air temperature sensor for combustion efficiency display with W-FM200 and O ₂ trim		0	0	0
W-FM 1000 CMS in lieu of W-FM 100 with colour graphical display (multi-lingual), and optional integration of customer-specific open and closed-loop control processes		0	0	0
Solenoid valve for air pressure switch test with continuously running fan or post-pu	rge	0	0	0
Oil pressure gauge with ball valve	in supply iin return	0	- -	0
Air inlet flange for ducted-air connection with LGW air pressure switch	80/1-B	0	0	0
Inverted air inlet (rotated by 180°)	80/1-B 80/2-A	0	0 0	0
Air inlet positioned at an angle other than 0° or 180°	80/1-B 80/2-A	0	0	0
Mirrored execution (motor on right-hand side)	80/1-B 80/2-A	0	0	0
Control voltage 110 V		0	0	0
Control voltage 24 V with W-FM 1000 CMS		0	0	0
External temperature-compensated flue gas recirculaton with FGR butterfly valve (4LN)		-	0	0

O Optional

- Not available

Dimensions WKmono 80 Standard and NR versions



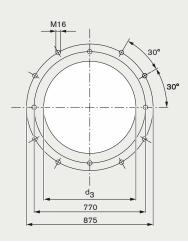


Dimensions - Standard and NR versions

Dimension	80/1-B	80/2-A
I1 - Burner length excluding combustion head	1635	1635
I2 - Combustion head length	425	500
h1 - Overall burner height	1661	1661
b1 - Overall burner width	1620	1732

Mounting plate drilling dimensions

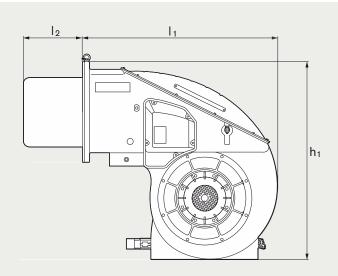
Dimension	80/1-B	80/2-A
d3 - Inner diameter	530	640

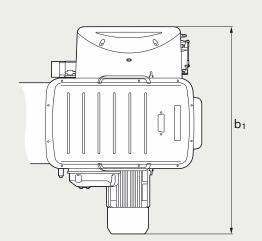


Dimensions in mm.

Dimensions are approximate. Weishaupt reserve the right to make changes in light of future developments.

Dimensions WKmono 80 3LN and 4LN versions



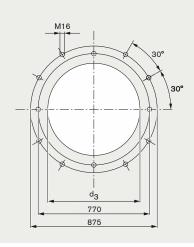


Dimensions - 3LN and 4LN versions

Dimension	80/1-B 3LN/4LN	80/2-A 3LN/4LN
I1 - Burner length excluding combustion head	1635	1635
12 - Combustion head length	444/446	510/512
h1 - Overall burner height	1661	1661
b1 - Overall burner width	1620	1732

Mounting plate drilling dimensions

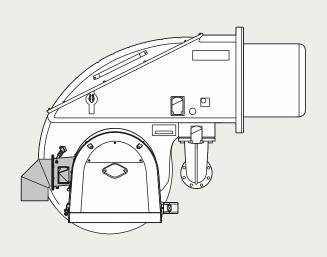
Dimension	80/1-B	80/2-A
d3 - Inner diameter	530	640

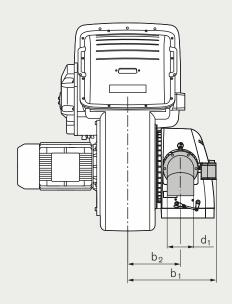


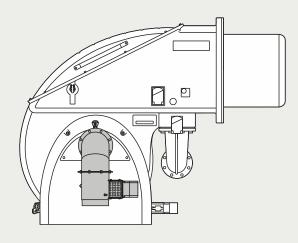
Dimensions in mm.

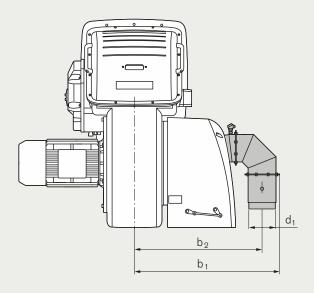
Dimensions are approximate. Weishaupt reserve the right to make changes in light of future developments.

Dimensions WKmono 80 FGR









Dimensions - FGR (flue gas recirculation)

Dimension	80/1-B	80/2-A
b1 - Centreline of burner mounting flange to outer edge of actuator	705	1158
b2 - Centreline of burner mounting flange to centreline of flanged elbow	422	1021
d1 - Flanged elbow diameter	216	215

Dimensions in mm.

 $\label{thm:problem} \mbox{Dimensions are approximate. We is haupt reserve the right to make changes in light of future developments.}$

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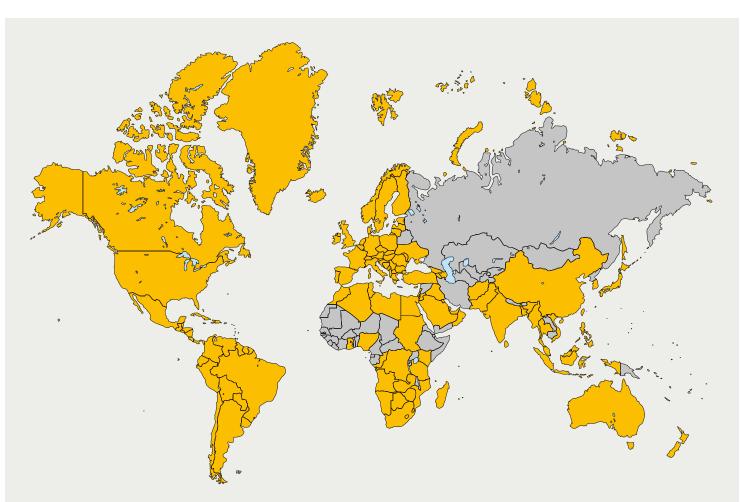
If you need us, we're there.

Weishaupt (UK) Ltd Neachells Lane, Willenhall, WV13 3RG Tel. (01902) 609841

info@weishaupt.co.uk www.weishaupt.co.uk

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